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REVIEW ARTICLE

MOMORDICA CHARANTIA: FOR TRADITIONAL USES AND PHARMACOLOGICAL ACTIONS

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ABSTRACT

Momordica charantia is a plant of the Cucurbitaceae family is known as bitter melon, karela, and pare. It grows in tropical areas of the Amazon, , Asia, South America India, East Africa and Caribbean, and is used traditionally as both food and medicine. The fruit ripens, the flesh (rind) becomes slightly tougher and bitterer, and many think it too repulsive to eat. On the other hand, the pith becomes sweet and intensely red; it can be eaten uncooked in this state, and is a popular part in some Southeast Asian salads .Momordica charantia have provided many remedies for various diseases from ancient days to now a day. It has been used in various Asian traditional medicines for the treatment of cholera, anemia, diarrhea blood diseases, bronchitis, gout, dysentery, gonorrhea rheumatism, ulcer, colic, worms, disease of liver and spleen, cancer and diabetes etc.In preliminary phytochemical analysis we observed glycosides, phytosterols, alkaloids, phenolic, saponins compounds, fats, proteins, and fixed oils, flavonoids, and thin layer chromatography (TLC) was also performed. The medicinal values of Bitter melon lies in the bioactive phytochemical constituents that are non nutritive chemicals that produce clear-cut physiological effects on human body and protect them from various diseases. Juice of *Momordica charantia* the leaves used to treat piles totally. *Momordica charantia* is used as a blood purifier due to its bitter tonic properties.

Keywords: *Momordica charantia,* medicinal properties, pharmacology.

INTRODUCTION

In the last few years there has been an exponential development in the field of herbal medicine and these drugs are gaining popularity both in developing and developed countries because of their natural origin and less side effects. *Momordica charantia* a part of the Cucurbitaceae family is known as bitter melon, bitter gourd, balsam pear, karela, and pare. It grows in tropical areas of the Amazon, East Africa, Asia, India, South America, and Caribbean. The plant is a climbing permanent with elongated fruit that resembles a warty gourd or cucumber. The unripe fruit is white or green in color and has a bitter taste that becomes more pronounced as the fruit ripens. *Momordica charantia* contains an collection of biologically active plant chemicals including triterpens, proteins, steroids, alkaloids, saponins, flavonoids and acids due to which plant possesses anti-fungal, anti-bacterial, anti-parasitic, anti-viral, anti-fertility, anti-tumorous, hypoglycemic and anti-carcinogenic properties .Fruits are used as traditional medication to cure various diseases like: rheumatism, gout, worms, colic, illness of liver and spleen.It is also found useful in the treatment of cancer and diabetes. It is a potent hypoglycemic agent due to alkaloids and insulin like peptides and a mixture of steroidal sapogenins known as charantin. Diabetes mellitus is the one of the five important causes of death in the world. It is a major global health problem with a probable rise in prevalence from 171 million in 2000 AD to 366 million in 2030 AD with majority still remaining undiagnosed. It is a syndrome of disordered metabolism, usually due to a combination of hereditary and environmental causes, resulting in abnormally high blood sugar levels.Etiologically, it is due to relative or absolute lack of insulin, the insensitivity of insulin or both. *Momordica charantia* is the most common plant used in alternate medicines used as anti-diabetic[1-14].

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Figure 1: *Momordica charantia* plant

VERNACULAR NAME[15]

English	Bitter gourd, Balsam pear, Balsam apple
Nepali	Teeta Karela
Arab	Quisaul – barri
Assam	Kakiral, Kakral
Bengali	Karela, Uchchhe, Kerula
Bombay	Kurela, Jangro
Guajarati	Karela
Hindi	Karela, Kardi
Kannada	Hagal
Malayalam	Kaipp, Kaippavlli, Paval
Oria	Kalara, Salara
Sanskri	Sushavi, Karavella
Tamil	Pakal, Pavaka,Chedi,Paharkai
Telgu	Koekara, Kaaya
Urdu	Karela

SCIENTIFIC IDENTIFICATION

Scientific name	*Momordica charantia*
Kingdom	Plantae
Division	Magnoliophyta
Family	Cucurbetaceae
Genus	*Momordica*
Species	*charantia*
Duration	Annual

CULTIVATION

Momordica charantia is an annual or perennial climber found all over India and also cultivated up to an height of 1500m. It is cultivated during temperate season i.e. during April to July by sowing seeds in a pit. Seeds are sown at a distance of ½ meter and provided with manures. Only one plant is retained and plant seedlings are watered once or twice a week. Plants start to flower 30-35 days after sowing and fruits are prepared for harvesting after flowering 15-20 days[16, 17].

TRADITIONAL USED

Momordica charantia has been used in various Asian traditional medicine systems for a long time, as useful for preventing and treating various diseases.

Fruits: *Momordica charantia* used in asthma, burning sensation, constipation, colic, diabetes, cough, fever (malaria), gout, helminthiases, leprosy, inflammation, skin diseases, ulcer and wound. It has also been publicized to have hypoglycaemic (antidiabetic) properties in animal as well as human studies. Juice of *Momordica charantia* the leaves used to treat piles totally. *Momordica charantia* is used as a blood purifier due to its bitter tonic properties. It can heal boils and other blood related problems that illustrate up on the skin. Juice of *Momordica charantia* is also beneficial in treating and preventing the liver damage.

Leaves: *Momordica charantia* are used in treatment of menstrual troubles,burning sensation, constipation, fever (malaria), colic,infections, worms and parasites, as an emmenogogue,measles, hepatitis and helminthiases. In Guyana traditional medicine, leaf tea is used for diabetes, to expel intestinal gas, to promote menstruation, and as an antiviral for measles, hepatitis, and feverish condition. It is used topically for sores, wound, infections and internally and externally for worms and parasites.

Seeds: *Momordica charantia* are used in the treatment of ulcers, liver and spleen problems, diabetes, high cholesterol, intestinal parasites, and intestinal gas, heal wounds and stomachache etc.

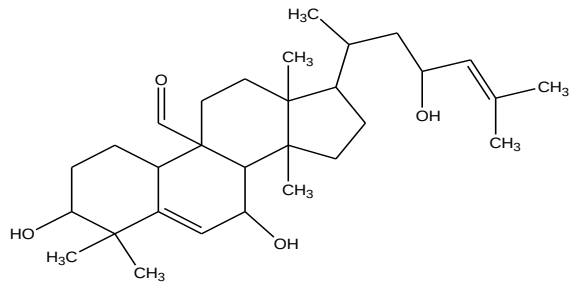
Roots: *Momordica charantia* are used in the treatment of syphilis, rheumatism, ulcer, boils, septic swellings, opthelmia, and in Prolapsusvagenae. *Momordica charantia* juice helps to reduce the problem of Pyorrhea (bleeding from the gums). *Momordica charantia* capsules and tinctures are widely available in the United States for the treatment of diabetes, colds flu, viruses, tumors, cancer, high cholesterol and psoriasis.

Ethnomedical Uses: In India, *Momordica charantia* used by tribal people for abortions, birth control, increasing milk flow, vaginal discharge, menstrual disorders, constipation, food, hyperglycemia, diabetes, jaundice, stones, kidney, liver, fever (malaria), eczema, gout, fat loss, hemorrhoids, hydrophobia, intestinal parasites, skin, pneumonia ,leprosy, psoriasis, rheumatism, scabies, piles, snakebite, vegetables, anthelmintic, purgative[18-25].

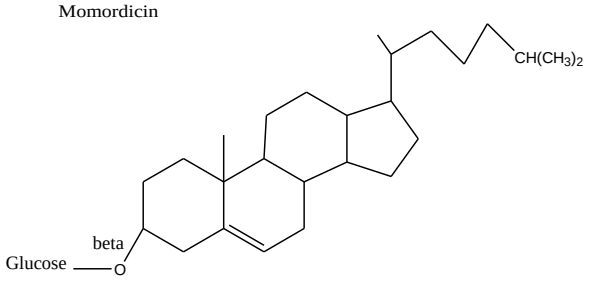
ACTIVE CONSTITUENTS

The main constituents of bitter melon *Momordica charantia* are triterpene, protein, steroid, alkaloid, inorganic, phenolic and lipid compounds. *Momordica charantia* consists the following chemical constituents those are alkaloids, momordicin and charine,

momorchanins, momordicilin, charantin, momordicius, momordenol, momordin, momordolol, cryptoxanthin, cucuritacins, cucurbitns, cycloartenols, cucuritanes, erythrodiol, elaeostearic acids, galacturonic acid, gentisic acid, goyaglycosides, goyasaponins, and multiflorenol, cucurbitacins, , cucurbitanes, diosgenin erythrodiol, guanylate cyclase inhibitors, gypsogenin, lauric acid, karounidiols, hydroxytryptamines, lanosterol, ,linoleic acid, linolenic acid, momordenol, momordicinin, momordicosides[28-28].



Momordicin



Charantin

DOSE

Dosage recommendation depends on the form of bitter melon being consumed. The dose of fresh juice *Momordica charantia* 50-100 ml but it isextremely bitter and difficult to swallow. Although encapsulated dry powder is easier to consume, the standard dose is given 3-15 g daily– a large dose in capsule form. A standardized, encapsulated extract dosage ranges from 100-200 mg three times daily[29].

WARNINGS AND CONTRAINDICATIONS

Momordica charantia seed extracts have been shown to induce abortion in mice and the root is a documented uterine stimulant, use is no recommended in pregnant women or those seeking pregnancy[30].

SIDE EFFECT AND TOXICITY

Momordica charantia Oral ingestion of bitter melon fruit is safe as demonstrated by Oral ingestion of bitter melon fruit is safe as demonstrated by Subcutaneous injection of p-insulin extracted from *Momordica charantia* appears to be safe; however, intravenous injection of *Momordica charantia* extracts is significantly more toxic and not recommended. Because bitter melon seeds contain momorcharin, are shown to have antifertility effects in female mice, bitter melon seed having antifertility effects in female mice, bitter melon seed pregnant[31].

PHARMACOLOICAL ACTIVITY

Antidiabetic Activity

Momordica charantia contains bitter chemicals like, vicine, charantin, glycosides and karavilosides along with polypeptide-p plant insulin, which are hypoglycemic in action and improve blood sugar levels by increasing glucose uptake and glycogen synthesis in the liver, muscles and fat cells. Some of research reports indicate that they also improve insulin release from pancreatic beta cells, and repair or promote new growth of insulin-secreting beta cells. P-Insulin, a polypeptide from the fruits and seeds rapidly decreased and normalized the blood sugar level in rats. Bitter melon contains another bioactive compound i.e. lectin that has insulin like activity. The insulin-like bioactivity of lectin is due to its linking together 2 insulin receptors. This lectin lowers blood glucose concentrations by acting on peripheral tissues and, similar to insulin's effects in the brain, suppressing appetite. This lectin is a major contributor to the hypoglycemic effect that develops after eating *Momordica charantia*. Charantin extracted by alcohol, is a potent hypoglycemic agent composed of mixed steroid swhich is sometimes used in the treatment of diabetes to lower the blood sugar levels[32-36].

Antimicrobial Activity

The *In vitro* studies have shown bitter melon extracts and the MAP30 protein analog, isolated from the seeds of *Momordica charantia* extracts, possess broad-spectrum antimicrobial activity. *Momordica charantia* extracts inhibit infection and growth of several viruses, including HIV, Epstein Barr virus.2 A and 24 *Herpes simplex*, preliminary report on the effect of *Momordica charantia* extract in three HIV patients showed a normalization of CD4/CD8 ratios with *Momordica charantia* treatment. It is believed *Momordica charantia* extracts inhibit HIV replication by preventing syncytial formation and cell-to-cell infection. *Momordica charantia* extracts also appear to inhibit the growth of numerous gram-negative and gram-positive bacteria, including Salmonella, *E. coli*, Shigella, Staphylococcus, Pseudomonas, Streptococcus, Streptobacillus, & *H. pylori*, and parasitic organisms *E. histolytica* and *Plasmodium falciparum*[37-39].

Anti-Cancer Activity

The clinical trials have not been conducted using *Momordica charantia* extracts in cancer patients, *in vitro* studies indicate bitter melon fruit and seed extracts inhibit the growth of a number of cancer cell lines, including prostate adenocarcinoma, human colon cancer (Caco-2 cells), and the very much metastatic breast cancer cell line MDAMB 231[40-41].

Anti-Malarial Activity

Momordica charantia is traditionally regarded by Asians, as well as Panamanians and Colombians, as useful plant for preventing against used treating malaria. Laboratory studies have confirmed that various species of *Momordica charantia* have anti-

malarial activity. Leaves brewed in hot water to create a tea to treat malaria[42].

Antioxidant Activity

Momordica charantia Different parts of the plant have been used in the Indian medicinal system for a number of ailments besides diabetes. Antioxidant activity of extracted phenolic compound from bitter melon has been reported the Antioxidant properties of *Momordica charantia* Seeds on Streptozotocin induced-diabetic rats has been studied and results clearly suggest that seeds of *Momordica charantia* may effectively normalize the impaired antioxidant status in streptozotocin induced-diabetes[43-44].

Hypocholesterolemic activity

Experiments carried out in normal as well diabetic animals have shown hypo-cholesterolemic effects by *Momordica charantia.* In a study, sunflower fed rats were fed with conjugated octadecatrienoic fatty acid isolated from *Momordica charantia* seeds for 4 weeks. After 4 weeks, these rats showed significant lowering of the plasma lipid peroxidation and erythrocyte membrane lipid peroxidation as well as nonenzymatic liver tissue lipid peroxidation[45].

Immunomodulatory activity

Immunomodulatory activity of *Momordica charantia* showed that it has a variable effect on the immune system in some conditions, like allograft rejection, someplace it was shown to have immunosuppressive effect and in some other cases immunostimulant. Immunomodulatory activity has been attributed to increase in interferon production and natural killer cell activity[46].

CONCLUSION

Momordica charantia is a plant of the Cucurbitaceae family is known as bitter melon, karela, and pare. *Momordica charantia* have provided many remedies for different diseases from ancient days to now a day. It has been used in various Asian traditional medicines for the treatment of cholera, anemia, ulcer, diarrhea blood diseases, bronchitis, gout, dysentery, worms, gonorrhea rheumatism colic, disease of liver and spleen, cancer and diabetes etc.

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